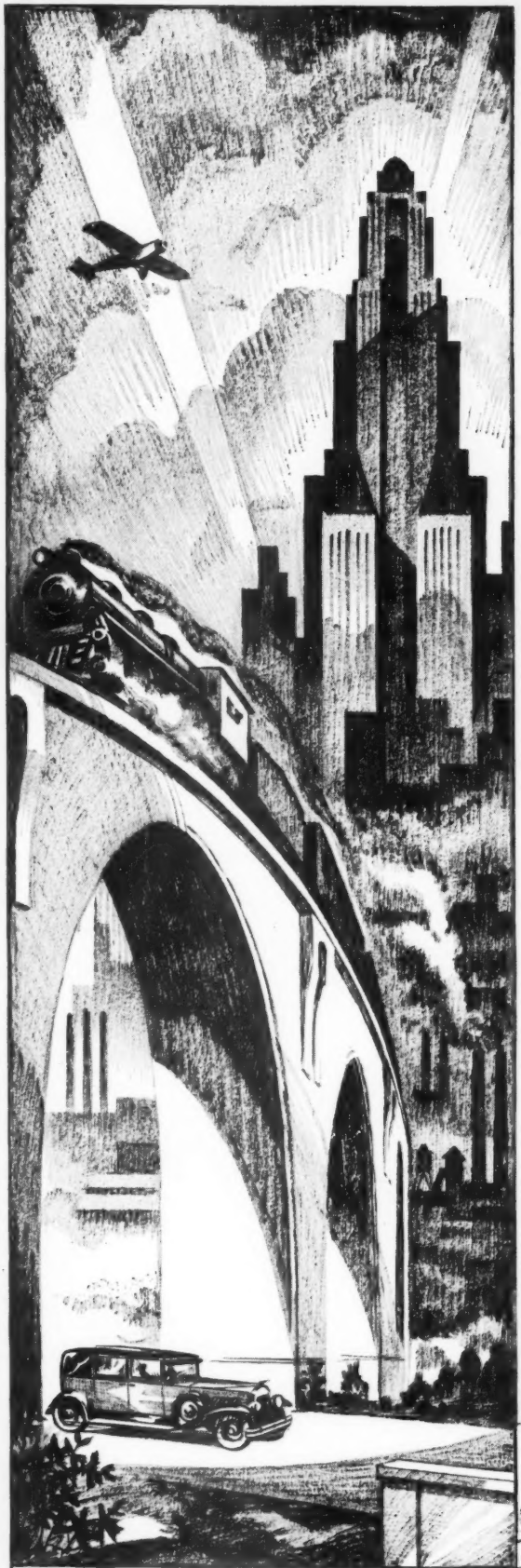

The CRUSHED STONE JOURNAL

In This Issue

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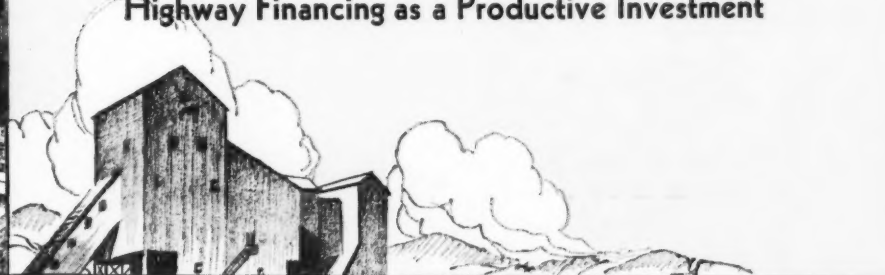

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Rock-Cut Stone Company	Lacona, N. Y.
Rock-Cut Stone Company	Watertown, N. Y.
Mohawk Limestone Products Company	Mohawk, N. Y.
Mohawk Limestone Products Company	Jordanville, N. Y.
Mohawk Limestone Products Company	Mount Vision, N. Y.
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Gager Lime Company	Sherwood, Tenn.
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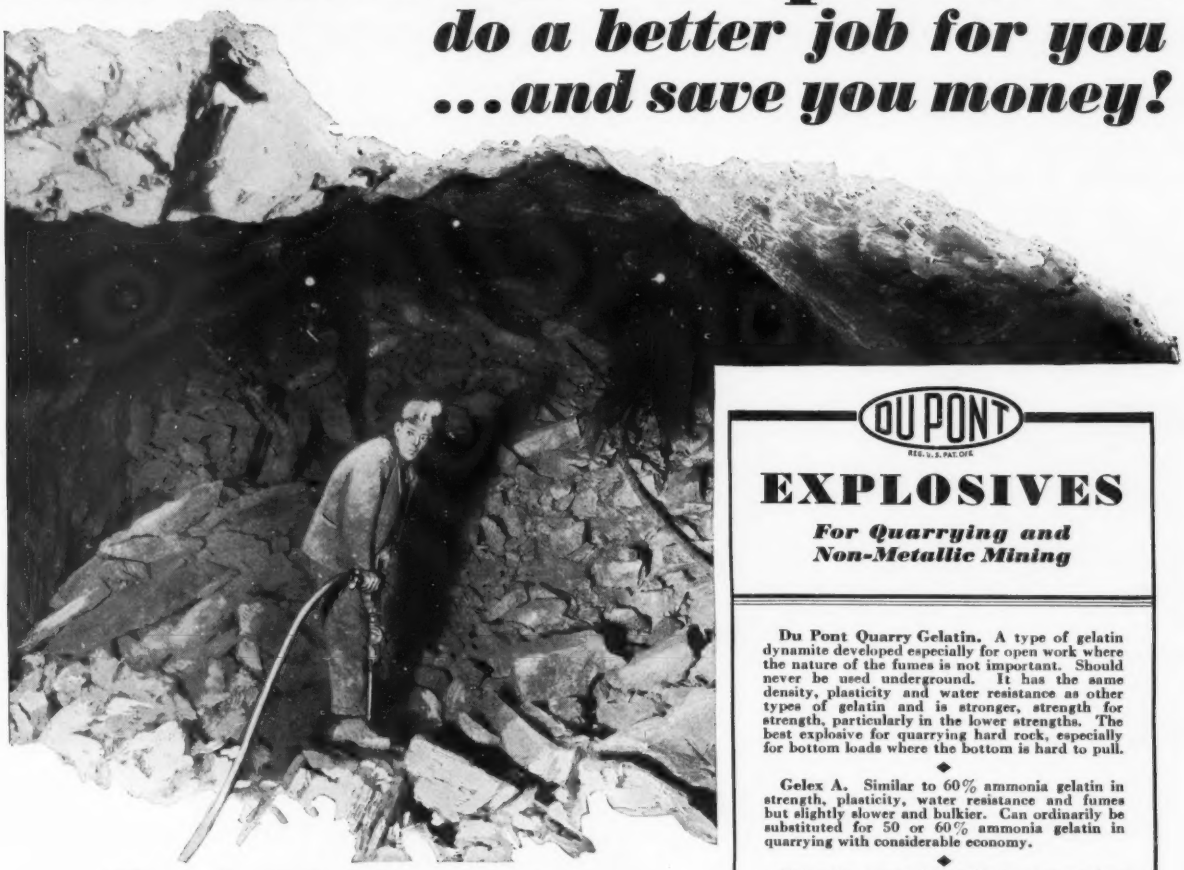

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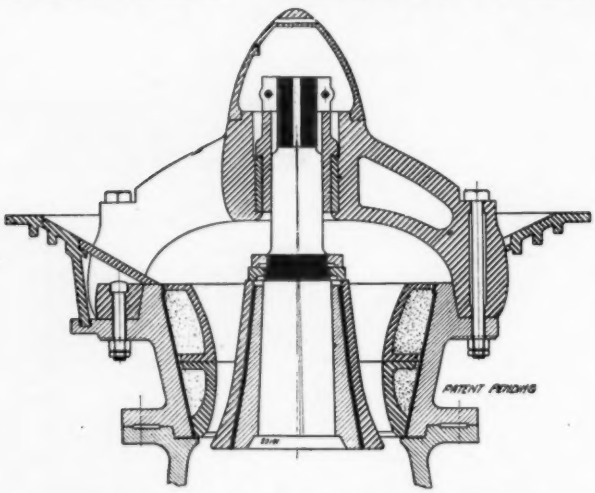

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The Crushed Stone Journal

Official Publication of the NATIONAL CRUSHED STONE ASSOCIATION

J. R. BOYD, Editor

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Published Monthly by the
NATIONAL CRUSHED STONE ASSOCIATION
Editorial and Advertising Office
1735 Fourteenth Street N.W.
Washington, D. C

William Penn Hotel, Pittsburgh, Pa., Where the Fifteenth Annual Convention of the Association will be held on January 19 to 22, 1932

THE
CRUSHED STONE JOURNAL
WASHINGTON, D. C.
Vol. VII No. 8 AUGUST, 1931

Board of Directors Selects Pittsburgh For Fifteenth Annual Convention

◆ Problems of unusual importance considered at mid-year meeting. Officers and committee chairmen report definite progress for first six months.

THE Fifteenth Annual Convention of the National Crushed Stone Association will be held at the William Penn Hotel, Pittsburgh, Pa., January 19, 20, 21 and 22, 1932, in accordance with the action of the Board of Directors of the Association taken at its mid-summer meeting held at the Ambassador Hotel, Atlantic City, N. J., on July 24 and 25. The invitation to hold the next annual convention in Pittsburgh was presented by the Pennsylvania Stone Producers' Association on behalf of its members located in the Keystone State, and it seems particularly appropriate that this group should be thus recognized for the loyal and enthusiastic support which has always been so freely given to the National organization. It will be remembered that Pittsburgh made a strong bid for the 1931 convention at the meeting of the Board of Directors held last summer, but when it seemed advisable to the Board to select St. Louis, the Pennsylvania group graciously stepped aside. Unquestionably, this courteous act must have been in the minds of the Board of Directors at its meeting this summer, for after receiving a number of invitations from various cities and hotels, presented by their personal representatives, it was with little or no discussion unanimously decided to hold the 1932 convention in Pittsburgh.

In selecting a convention city, the Board of Directors is by no means unmindful of the desirability of choosing a city which is centrally located, has excellent convention facilities as regards both the general convention activities and the Manufacturers' Division Exposition, and is operated by a management which thoroughly and sympathetically understands the handling of conventions. Pittsburgh and the William Penn Hotel admirably meet these requirements. Practically the entire seventeenth floor will be devoted to the housing of convention activities, ample space being provided for the general sessions, afternoon group meetings, and smaller committee meetings in rooms, all of which are particularly attractive and well appointed. The continued growth of the Manufacturers' Division Exposition each year since its inception has made it quite a problem to find adequate space for housing this feature of the annual convention, and it should be a source of very real gratification to the members of the Division to learn that the Exposition can be entirely housed in one large room. In view of present conditions the annual convention of the Association next January will without doubt be one of the most important in the history of the Association, and therefore, the selection of a city easily accessible to a very large percentage of the membership and the choosing of a hotel so admirably fitted to act as our host will assuredly meet with an enthusiastic response from the industry. As has been the case in past years arrangements will be made for reduced fares to the convention, regarding which complete information will be given later through these columns.

In determining upon the dates of the convention every precaution was taken to avoid conflict with the dates of conventions of other organizations in allied industries, and in selecting the third week of January this has been accomplished. In view of the fact that the American Road Builders' Association convention will be held in Detroit, January 11 to 16, the convention of the National Ready-Mixed Concrete Association in Pittsburgh at the William Penn Hotel on January 25 and 26, and the convention of the National Sand and Gravel Association also in Pittsburgh at the William Penn Hotel on January 27, 28 and 29, it is possible for those desiring to attend one or more or these meetings to do so at minimum expense. It should be particularly noted that the National Crushed Stone Associa-

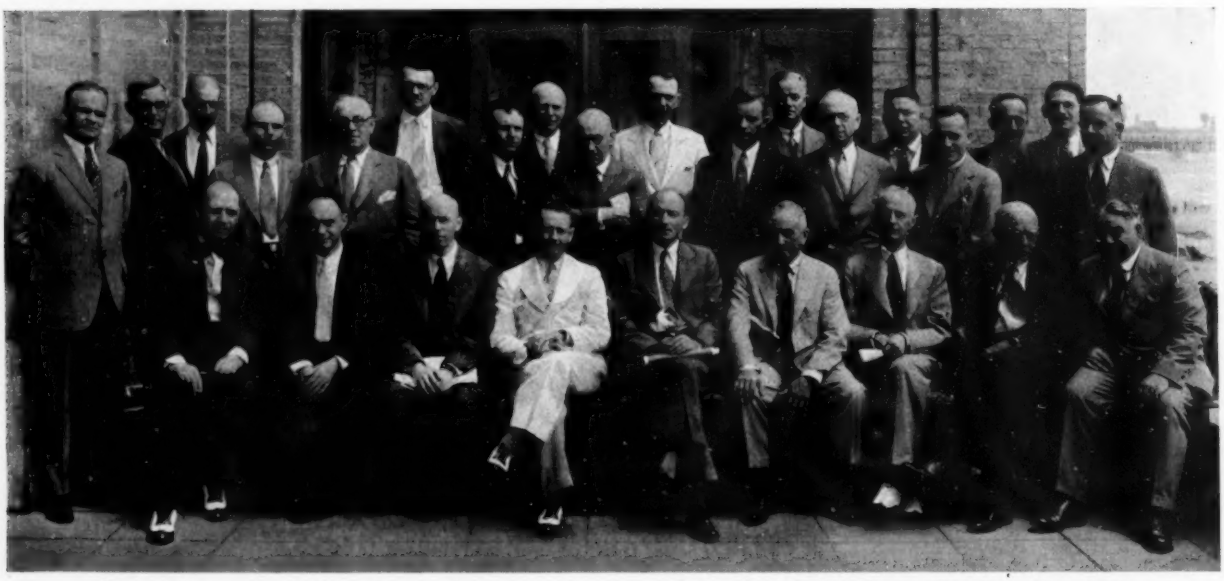
tion convention will open on Tuesday, January 19, departing from our custom of past years in opening the convention on Monday. Not only should this prove more convenient to the active delegates to the convention, but it should be particularly helpful to those manufacturers who will participate in the Expositions of both the National Crushed Stone Association and the National Sand and Gravel Association, as the number of days elapsing between these two conventions will be decreased by one.

Progress Reports Submitted

Comprehensive reports on the various activities of the Association, setting forth the progress made during the first six months of the year were submitted by the Director of the Bureau of Engineering, the Secretary and the Treasurer, and by the chairmen of the various standing committees. Space does not permit of a detailed account of these reports, but the following comments should be of interest.

A detailed analysis of the financial condition of the Association was submitted by the Secretary and Treasurer. Reports were rendered in connection with the General Operating Fund of the Association, the St. Louis Convention Fund, and the Special Research Fund. A balanced budget was submitted and approved. It was gratifying to the Board to note the sound financial condition of the organization and particularly the continued support of the membership under the present trying conditions. Excellent progress has been made in obtaining the Special Research Fund, approximately $6,000 having already been collected or pledged towards the total fund of $10,000 which the President was authorized to obtain by the Executive Committee at its meeting in March. It was the feeling of the Board that further effort should be made to raise the full fund of $10,000, by appeal to the members of the Board of Directors, the local associations and the membership at large.

A detailed report of the activities of the Bureau of Engineering was submitted by A. T. Goldbeck, Director, and in the following there is given a brief summary. Mr. Goldbeck indicated that the principal activities of the Bureau included publishing articles of benefit to the crushed stone industry; acting for individual producers or local groups of producers in connection with technical matters pertaining to the use of crushed stone (during the first six months contacts were made with the following in connection with matters pertaining to specifications or other aggregate problems: New York, Michigan, Indiana, Illinois, Tennessee, New Jersey, City of Washington, City of Chicago, Bureau of Public Roads, Supervising Architect's office); representing the industry on technical committees; general correspondence; presentation of papers and discussions before technical organizations; laboratory research. Mr. Goldbeck again pointed out that the greatest benefit of the work of the Bureau to the members of the Association is derived from that portion of the work which is of a basic nature. A study of fundamental problems in the laboratory, such as the stability of bituminous materials and the development of a proper soundness test, the development of a method for beam test, the design of concrete having a given beam strength, the publication of technical information, and the development of a size standard, are all projects having general application. He felt that it would be highly desirable to engage on such projects almost exclusively, but that it is recognized that individual problems of producers should also be solved. He stated that every effort was being made to properly take care of the individual problems as well as those of general application.



Among those present at the Board of Directors Meeting, Ambassador Hotel, Atlantic City, July 24 and 25

Research Advisory Committee Makes Recommendations

The report of the Research Advisory Committee, submitted by its chairman, P. B. Reinhold, was particularly comprehensive and included the following recommendations of especial interest. It was brought out in this report that a substantial percentage of the time of the Bureau of Engineering and Research Laboratory was necessarily devoted to special investigational work for individual member companies, and in this connection the Research Advisory Committee recommended to the Board that it would be proper to charge a fee for performing services of such a nature. The Board took definite action on the recommendation of the Committee by approving as a policy the assessing of special charges on any individual company which requires of the Bureau of Engineering special service local only to that company, but that the extent of such charges be determined by the Executive Committee and that the Executive Committee in determining the amount of such charges shall bear in mind all reasonable considerations which should affect its judgment.

The Board also approved the following recommendations of the Research Advisory Committee:

1. That a large proportion of the Special Research Fund be devoted to research in low-cost roads involving various bituminous types and that the research be initiated in the laboratory to be supplemented by field investigations.

2. That a smaller proportion of this fund be devoted to the continuance of investigations on railroad ballast and on stone sand for use as a fine aggregate in concrete.

The Board of Directors voted that the research fund as contributed be turned over to the Research Advisory Committee and Mr. Goldbeck to proceed immediately with the investigations as outlined in the report of the Research Advisory Committee.

Action Taken With Regard to Proposed Fifteen Per Cent Increase in Freight Rates

Probably no more important question was presented to the Board than what action, if any, the Association should take with regard to the proposal of the carriers for a blanket increase of 15% on all freight rates, as practically the entire Saturday morning session was devoted to a discussion of this subject. Preliminary to the discussion, W. R. Sanborn, Chairman of the Transportation Committee, briefly outlined to the Board the information which he had obtained from a questionnaire sent out to a representative group of producers throughout the country. A detailed and most careful discussion was then engaged in by practically every member of the Board, after which the position of the Association was expressed by the following motion which was passed.

It was voted that counsel be engaged to submit to the Interstate Commerce Commission a brief for the purpose of acquainting the carriers themselves, as well as the Commission, with our opinion: That the railroads are entitled to an increase in revenue and that we favor the granting of their petition; that we do not oppose their securing increased revenue from our industry by increasing rates insofar as such rate increase would actually result in increased revenue; that the nature of our industry is such as to lead us to believe that a 15% increase in crushed stone rates would fail to materially increase revenue and might even result in the decrease; that the railroads should be given the right by the Commission, if such right does not already exist, to afford to this industry such relief as in their judgment is warranted from a revenue standpoint immediately after any general freight rate increase is approved by the Commission; and finally that as a matter of relative equity, if the Commission should rule in the case of a competitive industry that no increase of freight rates should be made, that the same ruling be made applicable to us.

In accordance with the action thus taken by the Board, counsel will be employed and an appropriate brief presented before the Interstate Commerce Commission setting forth the position of the National Crushed Stone Association. Full information with regard to this will be given in a subsequent issue of *The Crushed Stone Journal.*

Report of Committee on Uniform Cost Accounting

In connection with the progress made by the Committee on Uniform Cost Accounting, W. E. Hilliard, Chairman, reported that after two years of effort there had been prepared and approved a Manual on Uniform Cost Accounting for the Crushed Stone Industry, which was being published and would shortly be distributed to the membership. Mr. Hilliard stated that shortly after the manual had been sent out blank sheets would be sent to each member of the Board of Directors with the request that he record thereon his cost data for 1930, making his figures conform as nearly as possible with the subdivisions as recommended in the manual. He particularly pointed out that each company would receive a code number so that the information sent in to the headquarters office would be held strictly confidential, and further that of course all responses to his request would be entirely voluntary, and that no particular effort would be made to obtain figures from those companies which preferred not to submit them. He expressed the hope that through the tabulation of such information a particularly interesting and helpful report could be presented at the time of the annual convention.

Revised Trade Practice Rules Are Approved

Mr. O. M. Graves, Chairman, Interpretation Committee—Trade Practice Rules, reported briefly the action of his committee in approving for the industry the Trade Practice Rules of the Crushed Stone Industry, as revised by the Federal Trade Commission. The action of Mr. Graves' committee in approving the revised rules for the industry was accepted by vote of the Board of Directors. The rules as originally es-

(*Continued on page* 22)

The Safety Contest of 1930 Among Crushed Stone Quarries

By W. W. ADAMS
Chief Statistician, Demographical Division,
U. S. Bureau of Mines.

THE United States Bureau of Mines and the National Crushed Stone Association have been cooperating for several years in conducting an annual safety contest among quarrying and mining companies that are members of that Association. A healthy spirit of rivalry has developed among the companies through their effort to win a trophy which the Association awards to the plant having the best safety record during the year. The trophy was provided by *The Explosives Engineer* magazine; it is presented to the quarry or mine having the smallest loss of time from accidents to its employees in proportion to the total number of man-hours worked by all employees at the plant. The contest is conducted by the United States Bureau of Mines as a part of the National Safety Competition, the latter being an annual safety contest in which are enrolled mines and quarries of various kinds. The Association's safety contest comprises those companies among its members which are enrolled in the National Safety Competition.

Among the mines and quarries enrolled in the National Safety Competition of 1930 were 68 open quarries and 6 underground limestone mines included in the membership of the National Crushed Stone Association. These plants were situated in 19 States, as follows: Connecticut, Illinois, Indiana, Kansas, Kentucky, Maryland, Massachusetts, Michigan, Minnesota, Missouri, Nebraska, New York, Ohio, Oklahoma, Pennsylvania, Tennessee, Texas, West Virginia, and Wisconsin. This enrollment represents an increase over the number of company members of the Association which were enrolled during the first contest year, 1925. In that year the enrollment covered 38 open quarries and 3 underground mines. As the number of underground mines enrolled each year is small, the safety conditions revealed by the records largely reflect those incidental to the operation of open quarries.

The 68 quarry operations that competed in the safety contest of 1930 were active 8,013,415 man-hours during the year, representing, approximately, the equivalent of 3,300 men working 300 days of eight hours each. This was a much larger representation of the crushed stone industry than that covered by the safety contest conducted in 1925 when the enrollment represented 4,927,396 man-hours, or the equivalent of 2,053 eight-hour workers for 300 days.

Complete records covering the 68 open quarries showed 6 fatal and 227 non-fatal injuries in 1930 with a loss of time or period of disability equal to 46,921 man-days. In calculating this loss of time each fatality is considered as representing 6,000 lost days, each permanent partial disability is charged with a loss of time depending upon the nature of the injury, and each temporary injury is charged with the actual number of calendar days, including Sundays and holidays, during which the employee was, because of his injury, unable to work. For each million man-hours of work performed at the 68 open quarries there were 30 accidents, as compared with 37 accidents per million hours worked at 53 open quarries in the preceding year. The loss of time from all accidents at these quarries averaged 5.9 days per thousand hours, as compared with 4.4 days for 1929. Thus there was a reduction in the frequency of accidents in 1930, but those that occurred were somewhat more serious than in the previous year. The increase in the accident-severity rate was confined to fatalities and permanent injuries, as the severity rate for temporary injuries was not as high in 1929.

Similar records covering six underground limestone mines, with a total of 595,367 man-hours of work, showed 1 fatality, 1 permanent partial disability, and 15 temporary lost-time injuries, involving, in all, a loss of 6,693 days. For these mines the accident-frequency rate was 28.6 as compared with the previous year's rate of 48.1 for four mines that worked 665,520 hours. The severity rate for 1930 was 11.2; that of the preceding year was 10.4.

Individual plants in each of the two groups—open quarries and underground mines—covered by the contest, were graded according to the number of hours worked in proportion to the number of days lost because of accidents, that is, according to their accident-severity rates. The relative standing of the plants when arranged in this way is shown in Tables 1 and 2.

Particular interest attaches to the progress made in accident prevention by quarries that have participated in the safety contest regularly over a period of years. Among the 68 quarries that were represented in the crushed stone contest of 1930, there were 25 quarries that have competed in the safety contest during each of the past six years. These 25 plants had only 22.2 accidents per million man-hours of exposure in 1930, having made that favorable record by reducing their accident rate from 48.7 accidents per million man-hours in 1925. Progress in safety by these identical quarries was greater than that shown by the general average of all companies in the contest. Comparative figures for the 25 plants and for all crushed stone quarries that competed for the trophy are as follows,

TABLE 1.—NATIONAL CRUSHED STONE, OPEN QUARRY GROUP, 1930 [1]

Rank	Hours Worked	NUMBER OF ACCIDENTS [2]					NUMBER OF DAYS OF DISABILITY [2]					Frequency Rate [3]	Severity Rate [3]
		Fatal	P. T.	P. P.	Temp.	Total	Fatal	P. T.	P. P.	Temp.	Total		
1	296,997					0					0	.000	.000
2	224,514					0					0	.000	.000
3	174,653					0					0	.000	.000
4	157,633					0					0	.000	.000
5	143,000					0					0	.000	.000
6	141,706					0					0	.000	.000
7	104,183					0					0	.000	.000
8	98,048					0					0	.000	.000
9	92,723					0					0	.000	.000
10	79,442					0					0	.000	.000
11	69,776					0					0	.000	.000
12	59,231					0					0	.000	.000
13	54,909					0					0	.000	.000
14	52,307					0					0	.000	.000
15	47,405					0					0	.000	.000
16	44,530					0					0	.000	.000
17	40,522					0					0	.000	.000
18	25,778					0					0	.000	.000
19	1,097					0					0	.000	.000
20	129,996				2	2				2	2	15.385	.015
21	85,824				1	1				2	2	11.652	.023
22	195,397				1	1				5	5	5.118	.026
23	187,010				2	2				9	9	10.695	.048
24	88,160				2	2				7	7	22.686	.079
25	86,195				1	1				7	7	11.602	.081
26	121,663				4	4				12	12	32.878	.099
27	253,412				8	8				46	46	31.569	.182
28	85,822				1	1				18	18	11.652	.210
29	125,436				2	2				36	36	15.944	.287
30	33,961				3	3				10	10	88.337	.294
31	69,000				4	4				23	23	57.971	.333
32	160,452				3	3				54	54	18.697	.337
33	82,792				5	5				29	29	60.392	.350
34	78,379				2	2				28	28	25.517	.357
35	43,677				3	3				16	16	68.686	.366
36	224,912				4	4				87	87	17.785	.387
37	40,879				3	3				16	16	73.387	.391
38	85,592				3	3				35	35	35.050	.409
39	105,910				4	4				44	44	37.768	.415
40	137,624				10	10				60	60	72.662	.436
41	112,909				5	5				53	53	44.283	.469
42	54,197				3	3				27	27	55.354	.498
43	191,323				6	6				108	108	31.361	.564
44	190,276				2	2				117	117	10.511	.615
45	114,057				2	2				83	83	17.535	.728
46	147,884				6	6				109	109	40.572	.737
47	116,677				1	1				88	88	8.571	.754
48	75,665				5	5				61	61	66.081	.806
49	68,082				3	3				57	57	44.065	.837
50	105,320				2	2				96	96	18.990	.912
51	57,488				5	5				53	53	86.975	.922
52	202,337				9	9				235	235	44.480	1.161
53	77,526				4	4				92	92	51.596	1.187
54	103,429				2	2				132	132	19.337	1.276
55	107,000				5	5				155	155	46.729	1.449
56	63,226				6	6				93	93	94.898	1.471
57	179,270				11	11				297	297	61.360	1.657
58	109,101				2	2				207	207	18.332	1.897
59	785,990			2	53	55			900	604	1,504	69.975	1.914
60	63,972				2	2				139	139	31.264	2.173
61	81,901			1	1	2			300	2	302	24.420	3.687
62	176,278			1	1	2			750	36	786	11.346	4.459
63	47,941			1	4	5			300	10	310	104.295	6.466
64	89,318			1	1	2			800	3	803	22.392	8.990
65	117,978			1		1			2,400		2,400	8.476	20.343
66	140,946	1			1	2	6,000			26	6,026	14.190	42.754
67	63,363	1			7	8	6,000			62	6,062	126.257	95.671
68	39,414	4		2	10	16	24,000		1,800	180	25,980	405.947	659.157
Totals and Rates 1930	8,013,415	6	0	9	227	242	36,000	0	7,250	3,671	46,921	30.199	5.855
Totals and Rates 1929	7,970,325	4		5	286	295	24,000		5,760	5,533	35,293	37.012	4.428

[1] As the accident reports from mining companies are considered confidential by the Bureau of Mines the identities of the mines to which this table relates are not revealed.

[2] P.T. means permanent total disability; PP. means parmenent partial disability; and TEMP. means temporary disability.

[3] Frequency rate indicates number of fatal, permanent, and other lost-time accidents per million man-hours of exposure; severity rate indicates number of days lost from accidents per thousand man-hours.

TABLE 2.—NATIONAL CRUSHED STONE ASSOCIATION, NON-METAL-MINE GROUP, 1930 [1]

Rank	Hours Worked	NUMBER OF ACCIDENTS [2]					NUMBER OF DAYS LOST [2]					Frequency Rate [3]	Severity Rate [3]
		Fatal	P. T.	P. P.	Temp.	Total	Fatal	P. T.	P. P.	Temp.	Total		
1	30,214	-----	-----	-----	-----	0	----------	------	---------	---------	0	.000	.000
2	83,711	-----	-----	-----	3	3	----------	------	---------	7	7	35.838	.084
3	144,054	-----	-----	-----	3	3	----------	------	---------	100	100	20.826	.694
4	49,500	-----	-----	-----	3	3	----------	------	---------	42	42	60.606	.848
5	140,133	-----	-----	1	5	6	----------	------	225	195	420	42.816	2.997
6	147,755	1	-----	-----	1	2	6,000	------	---------	124	6,124	13.536	41.447
Totals and Rates 1930	595,367	1	0	1	15	17	6,000	0	225	468	6,693	28.554	11.242
Totals and Rates 1929	665,520	1	0	1	30	32	6,000	0	300	617	6,917	48.083	10.393

[1] As the accident reports from mining companies are considered confidential by the Bureau of Mines the identities of the mines to which this table relates are not revealed.

[2] P.T. means permanent total disability: PP. means permanent partial disability; and TEMP. means temporary disability.

[3] Frequency rate indicates number of fatal, permanent, and other lost-time accidents per million man-hours of exposure; severity rate indicates number of days lost from accidents per thousand man-hours.

TABLE 3.—ACCIDENT RATES FOR TWENTY-FIVE IDENTICAL OPEN QUARRIES HOLDING MEMBERSHIP IN THE NATIONAL CRUSHED STONE ASSOCIATION IN 1930

Year	Hours Worked	NUMBER OF ACCIDENTS					NUMBER OF DAYS LOST					Frequency Rate	Severity Rate
		Rank	P. T.	P. P.	Temp.	Total	Fatal	P. T.	P. P.	Temp.	Total		
1925	3,877,000	3	0	2	184	189	18,000	0	1,800	3,975	23,775	48.749	6.132
1926	3,711,713	0	0	3	156	159	0	0	5,100	2,988	8,088	42.837	2.179
1927	3,886,259	5	0	1	178	184	30,000	0	300	2,777	33,077	47.346	8.511
1928	3,387,306	4	0	2	116	122	24,000	0	2,100	2,134	28,234	36.017	8.335
1929	3,148,993	4	0	2	74	80	24,000	0	600	1,705	26,305	25.405	8.353
1930	2,931,986	2	0	3	60	65	12,000	0	3,450	1,139	16,589	22.169	5.658

the figures indicating the number of fatal, permanent and temporary lost-time injuries per million man-hours.

INJURIES PER MILLION MAN-HOURS

	All Open Quarries		Twenty-five Identical Open Quarries
	No. of Quarries	Rate	Rate
1925	38	60.7	48.7
1926	40	40.8	42.8
1927	48	59.5	47.3
1928	53	44.5	36.0
1929	53	37.0	25.4
1930	68	30.2	22.2

While these figures indicate a gratifying reduction in the accident rates for both groups of plants, they show that the 25 identical plants that have competed with one another in safety effort regularly for six years have had a more favorable safety record and have made greater progress in safety particularly during the last two years.

Progress has been made in shortening the duration of disability from temporary injuries. While the figures have varied from year to year, the group average was only 16.2 days for all open quarries in the 1930 contest as compared with 18.1 days in the contest of 1925. Corresponding figures for 25 identical plants showed an average loss of 21.6 days per temporary disability in 1925, as compared with 19.0 days in 1930.

Tables 1 and 2 showed the relative standing of the plants that competed in accident-prevention work in 1930, arranged according to their accident-severity rates. Table 3 represents the yearly accident rates for the group of 25 identical crushed stone open quarries that have competed in the contest each year since 1925.

Highway Bonds Now Desirable

Bonding for state highway construction has been a paying investment in every instance according to a report of the American Road Builders' Association. Tangible savings from lowered cost of operation are in excess of construction and maintenance costs in all cases.

The savings in operating costs to motorists of Illinois are estimated to be $333,000,000 since the improved highway program was started which is considerably more than the first cost, interest and amortization charges on the $160,000,000 highway bond issue.

Bonding is generally recommended, the report states, for both states and counties where credit is sound, where there is an urgent need for highways, and where there is a fixed annual income. The issuing of bonds should be preceded by economic studies of credit conditions of the political subdivision, industrial growth, agricultural needs, population trends, transportation demands, and the availability of road building materials.

The Value of Cost Accounting

By J. A. CONWAY, Accountant
John T. Dyer Quarry Co., Norristown, Pa.

◆ Many crushed stone producers do not fully appreciate the value of systematic cost accounting while those who have installed such systems have quickly recognized their very real value. The following article should be especially helpful as Mr. Conway discusses the specific application of cost accounting to the production of crushed stone. A second article by Mr. Conway, which will appear in the next issue of the Journal, describes the installation and operation of the system of uniform cost accounting for the crushed stone industry which has been approved by the National Crushed Stone Association.

COST Accounting is a branch of General Accounting. Its purpose is to give information in sufficient detail as to the separate components of costs which enter into a product. General Accounting shows only the total profit or loss of a business as a whole; Cost Accounting shows the costs of each department or unit in the business. To secure accurate results Cost Accounting and General Accounting are carried on concurrently, the two classes of records being unified by the use of controlling accounts, such as "Quarry Costs", "Well Drilling", "Stripping", etc.

A quarry operator may be producing crushed stone and selling it at a profit, as disclosed by his general accounting records, yet several of the departments in the quarry or plant, such as: "Loading Stone for the Crusher" or "Hauling Stone to the Crusher", may be operating at excessive costs and thereby keeping his profits lower than they should be. A general accounting system will not disclose such facts, while a cost accounting system will not only disclose them, but also show the reason for such excessive costs.

Objections to Cost Accounting

1. Distinctive Type of Business.
2. Red Tape.
3. Failure of Numerous Cost Systems.
4. Cost of Installation and Operation.

Distinctive Type of Business

Many quarry operators object to cost accounting on the grounds that their business is different from others and therefore any cut and dried system of cost accounting is not practical and will not work out in their business. That their business is different from others is true enough; but to suppose that methods cannot be devised to fit their particular needs and prove practical in scores of different ways is far from being true. It is a commonplace of successful accounting practice that installations and development of every system must be adapted in its details to the conditions, but certain principles and certain basic records govern the account keeping in every business of the same type.

Another objection under this heading, is that even if a system of costs can be devised to fit a quarry operator's needs, of what value is it? The quarry industry is not like other industries whose prices fluctuate with the market and whose demand increases or decreases with the price. Its market is fixed, regardless of price, which means, it does not need cost accounting with its consequent current costs. Such an attitude has placed the coal industry in its present condition. Substitutes took away its once thriving business. The crushed stone industry has been farsighted in establishing a research laboratory to protect its present markets and to develop additional outlets for its products. The way to maintain this present market and enter other fields is through lower costs and research. Cost Accounting will keep costs at a minimum, thereby, giving the research laboratory the encouragement to enter into other fields of endeavor.

Red Tape

Reports, reports and more reports is the idea that enters the mind of the average person when the subject of cost accounting is discussed. Quarry operators feel that they are kept busy now without a cost system and its resultant red tape, and with one they would have to move their boarding house to the quarry. The reverse would be more near the truth. Most cost systems which have been properly planned and which are operated efficiently, provide for numerous short cuts in summarizing the information for accounting purposes. Through cost accounting, quarry operators should have more time to attend to matters which properly require their attention and at the same time, let them know more about their business than they ever did before.

Failure of Numerous Systems

Cost systems have failed through one or more of the following causes:

1. Management not in sympathy with system.
2. Opposition or lack of co-operation on part of employees.
3. Impracticable System.
4. Practicable System improperly installed.

To succeed, the Quarry Operators, themselves, must be 100 per cent in back of the system. If they are luke warm they cannot expect the employees to be 100 per cent for it. Opposition to change or inertia must be laid aside if the full benefit is to be derived from the cost system.

The full cooperation of the workers is essential since it is they who supply the information from which the cost figures are obtained. The quarry operator, to secure this cooperation, must use another interest factor besides "Fear" to force the men to work. The use of fear develops the type of worker who keeps one eye out for the boss, taking things easy when the boss is not in sight and working like "forty" when he is present. Most workers are more fortunate in this respect than the man who worked himself to death because he was so near-sighted that he could not tell whether his boss was in sight or not. To secure accurate information for the cost system other interest factors such as Ambition, Job Pride, Self Respect and Curiosity must be brought into play. The person in whose care the system is placed must not be antagonistic to either the system or the workers, otherwise, the system will fail.

Impracticable systems have been installed in the past by so called "efficiency experts" who had a panacea to cure all ills. The acid test of the success or failure of a cost accounting system is whether it is or is not serving all of its functions, obtaining accurate costs, eliminating waste and producing profits.

A system even though practicable has to be installed properly. Each plant should be visited and conditions in each department studied carefully. Every plant has peculiarities that bear upon the methods of costing and this makes each quarry and plant a problem in itself.

Cost of Installation and Operation

The cost of operation of the cost system approved by the National Crushed Stone Association should not add excessive costs. In some plants additional help in the way of clerical work will not be necessary and the existing reports from the quarry will be satisfactory. In other quarries, reports will be added and some done away with. In all very little added expense will be necessary. If the cost system does not save money far in excess of the cost of operation, something is wrong with the system. It must be remembered that a cost system cannot be operated successfully without brains and if the information disclosed is not used to advantage, the cost system is not serving its purpose as a producer of profits.

Cost of Installation is not really an objection if quarry operators would weigh cost against the saving or income producing power of the system.

Advantages of Cost Systems

There are so many advantages to cost accounting that only a few are going to be discussed under the following headings:

1. Elimination of Waste
   - (A) Labor
   - (B) Material
   - (C) Equipment
2. Monthly Reports
3. Uniform Cost Accounting.

Elimination of Waste

Elimination of Waste Labor—Quarry Operators think of power in such terms as steam, electricity, or water. They are willing to discuss any of these at any and all times with the hope of making a saving in costs. Man Power, the largest single item appearing in their costs of production, they try to control through the worn out interest factor known as "Fear", which carries with it, as a side-kicker, waste. Employees are allowed to go on from day to day thinking destructively, which is not only harmful to themselves, but unproductive and wasteful to the quarry operator. What a change would take place, if Bill Smith were commended either personally or by letter by the Quarry Operator for operating his shovel for a 30 day period without any lost time for repairs, or the quarry foreman were commended for pushing more stone through the crusher during a 30 day period than ever went through before, or Harry Jones were commended for operating his truck or locomotive over a certain period at a very low cost.

Cost accounting will enable the Quarry Operator to do this, by giving him information covering performances of the various departments and equipment in them and of the men who have control of these departments and equipment. It enables the Quarry Operator to bring into play the other interesting factors such as Ambition, Job Pride, Self Respect, Curiosity, etc., which change the mental attitude of the employees to thinking constructively. This change of attitude is certain to eliminate waste, lower costs and increase profits.

Much of the unrest today in all industry is a result of the exercise of poor judgment upon the part of managers and owners in allowing waste in labor and materials to go on unchecked. Cost accounting will aid Quarry Operators to uncover this waste by placing before them a monthly picture of each department at the quarry or quarries, and at the same time be a

strong incentive in securing the interest of employees in production.

Elimination of Waste Material—What has been said regarding waste in labor also applies to waste in material. Workers, unless they are made to see the plant as a whole and their own immediate place in that plant will undoubtedly disregard the rights of others in the use of material and equipment. Material is wasted by some employees who acquire more than their immediate needs and throw what is not used away; others hide this excess for future use and either forget that they hid it, or where they hid it. The mislaying of tools is another practice which is very wasteful, the writer knowing of an incident where ten men looked for three days for a sledge hammer, the original cost of which was two dollars. Service equipment is compelled to stay idle waiting for the foreman of the department, for which it is going to perform some service, to allow it and the operator to start working. The abuse of material, tools and equipment is also a source of waste.

Cost accounting will materially aid in correcting these abuses. Workers, when they know that they or their departments are charged with the material received, will only take what is necessary, and return to its proper place the material not used. Service equipment will be put to work immediately upon its arrival in a department and its operator informed as soon as the job is finished, if such departments are charged on some basis such as—cost per every hour equipment is in the department. Employees will also, upon learning that they or their departments are charged with material received, report more readily the receipt of inferior material.

Elimination of Waste Equipment—Quarry Operators, when approached by "High Pressure" salesmen who hope to sell them equipment, are at a loss to combat the arguments of the salesmen when they cite the low cost of operation of the equipment they are selling. The result is, Quarry Operators are loaded up with equipment far in excess of requirements, resulting in plants which are not properly balanced and whose costs are excessive. Cost accounting will furnish the Operator with data which will show the cost of operating the equipment in the various departments and will be a guide in the purchasing of equipment in the future.

Monthly Reports

To stop the wide fluctuations in cost that now occur in the quarry industry, cost accounting with its resultant monthly reports is necessary.

Quarry Operators, due to seasonal demand, usually stop producing at their plants in the early months of the year for a general overhauling of equipment and as the season progresses, forget about this overhauling expense until they are face to face with a very small margin of profit, or a deficit, at the close of the year. This practice, not only does harm to the individual operator, but to the industry as a whole, as stone is sold in the peak months of the year at a figure far below true costs. Cost accounting will provide for this overhauling expense by setting such expense up as a deferred item and gradually absorbing it during the year, by charging every ton produced with its proportionate share, thereby, aiding in eliminating one of the causes for wide fluctuation in costs that now exists.

Cost data should be available for analysis shortly after the close of each month, as without current information it is impossible for Quarry Operators to ascertain fluctuations, other than that due to improper handling of overhauling expense, previously mentioned. Careful analysis of monthly cost data will enable the quarry operator to detect these fluctuations and aid in applying effective remedies. Without monthly reports it is a case of locking the barn after the horse is stolen.

Monthly reports, many operators will no doubt think are impossible due to their small office force and the added expense. To offset this line of thinking, the writer knows of one company that operates three quarries having a total production of from 800,000 to 1,000,000 tons yearly, monthly reports of which are available on the 10th of each month and which did not have to add additional help to its office force.

Uniform Cost Accounting

Objections will be raised to the cost accounting system approved by the National Crushed Stone Association because of the belief that it will necessitate the discarding of present accounting methods. This objection is due to a misunderstanding, as the cost accounting system may be adopted by some without any change, while others will only have to change one or two of their present records, due principally to their obsolescence.

If Quarry Operators would apply a name other than Uniform Cost System to the cost outline much light would be thrown on the subject. Uniform Cost Accounting does not mean that every quarry operator should have books and records identically the same, as this would be impracticable and impossible in many cases due to various conditions. What it does mean, is the outlining of standard principles of cost accounting to insure the charging of like items to like accounts so that a comparison of costs may be had with a view of eliminating waste.

Comparison of costs through the operation of a uniform method of cost accounting will eliminate ruinous competition which is due to ignorance of accurate costs. If a quarry operator cannot make money in competition with other quarry operators when using the same methods of figuring costs he can only conclude that conditions at his plant are costing too much.

Marquette Cement Manufacturing Company Wins Safety Contest for Third Successive Year

◆ Results of the 1930 Safety Contest among members of the National Crushed Stone Association show seventeen plants which completed the year with no lost-time accidents.

FOR the third time in as many years the Cape Girardeau plant of the Marquette Cement Manufacturing Company, located at Cape Girardeau, Mo., is the winner of the Safety Contest which is held annually between the members of the National Crushed Stone Association which enter their plants in the National Safety Competition sponsored by the *Explosives Engineer*, and held under the jurisdiction of the United States Bureau of Mines. The winner of the contest is each year presented with the *Explosives Engineer* award, which it is permitted to hold throughout the following year. Because of the outstanding record of being the winner for three successive years, the Cape Girardeau plant of the Marquette Cement Manufacturing Company will be permitted to retain permanent possession of this trophy, in accordance with the conditions originally set forth by the *Explosives Engineer*, in donating the trophy to the National Crushed Stone Association.

The Safety Contest is judged each year by W. W. Adams of the United States Bureau of Mines, and in an article appearing elsewhere in this issue, the results of the contest for 1930 are given in full detail. It will be noted that in Mr. Adams' article, there are shown nineteen plants which completed the year with no lost-time accidents. It developed, however, that two of these plants were not eligible for the National Crushed Stone Association Safety Contest because none of the stone produced by them was used in commercial consumption, a condition of the contest. Also in accordance with the rules of the contest, the Bureau of Mines, when more than one plant completes the year with a perfect record, rates such plants according to their respective total man-hours of exposure, the one having the highest number of man-hours of exposure winning the contest, and each of the others making perfect records receiving honorable mention.

In accordance with this rule, the Cape Girardeau limestone quarry of the Marquette Cement Manufacturing Company was designated the winner of the 1930 contest with a total exposure of 224,514 man-hours.

Sixteen Plants Receive Honorable Mention

The following plants received honorable mention and have been listed in accordance with their respective man-hours of exposure.

Man Hours of Exposure	
174,653	Holston Limestone Quarry of the American Limestone Company, Mascot, Tenn.
157,633	Rock Hill Trap Rock Quarry of the General Crushed Stone Company, Rock Hill, Pa.
143,000	Spore Limestone Quarry of the National Lime and Stone Company, Spore, Ohio.
141,706	Nos. 5 and 6 Limestone Quarries of the North American Cement Corporation, Martinsburg, W. Va.
104,183	Holland Limestone Quarry of the France Stone Co., Maumee, Ohio.
98,048	Security Limestone Quarry of the North American Cement Corp., Security, Md.
92,723	Jamesville Limestone Quarry of the General Crushed Stone Company, Syracuse, N. Y.
79,442	No. 2 Limestone Quarry of the Southwest Stone Co., Chico, Texas.
69,776	North Baltimore Limestone Quarry of the France Stone Co., North Baltimore, Ohio.
59,231	Ridgeville Limestone Quarry of the Mid-West Rock Products Corp., Ridgeville, Ind.
54,909	Spencer Limestone Quarry of the Mid-West Rock Products Corp., Spencer, Ind.
52,307	Kenneth Limestone Quarry of the France Limestone Co., Logansport, Ind.
47,405	Rocky Hill Trap Rock Quarry of The Connecticut Quarries Co., Inc., Rocky Hill, Conn.
40,522	Mt. Carmel Trap Rock Quarry of The Connecticut Quarries Co., Inc., Mt. Carmel, Conn.
25,778	Plant "R" (Wyandotte County, Kansas) Stewart Sand & Material Co., Kansas City, Mo.
1,097	Sparks Quarry of the Kentucky Consolidated Stone Co., Mt. Vernon, Ky.

It is particularly interesting to note that a number of the member companies entered in the contest had more than one plant which completed the year with a perfect record. Included among such distinguished companies are the General Crushed Stone Company with two plants, the North American Cement Corporation with two plants, the France Stone Company with three plants, the Mid-West Rock Products Corporation with two plants, and The Connecticut Quarries Co., Inc., with two plants.

In passing, it seems appropriate to note that the Rock Hill Trap Rock Quarry of the General Crushed

(*Continued on page* 23)

Highway Financing As a Productive Investment[1]

By THOS. H. MacDONALD
Chief, Bureau of Public Roads, U. S. Department of Agriculture, Washington, D. C.

◆ Economy in governmental expenditures will be more and more insisted upon by popular demand. Such a policy, carried to extremes, will defeat its own objectives. Improved highways constitute an income-producing investment rather than a matter of governmental expense.

ABOUT two decades have passed since one of our states, predominantly agricultural in character, built its first mile of rural paved roadway. The cost was financed in part from public funds and in part from private contribution. Not at that time nor for many years following did anyone foresee that the same state would be able, as it was in the one year, 1930, to finance and to build more than 1,000 miles of standard paved roadways, or that by the end of 1932 its system of primary rural highways would be nearing completion to modern standards of construction.

The Road User Paid

Even with statistical proof it is difficult to convince the public at large, much less those of other countries, that the cost of this whole primary-road improvement program has been predicated upon the road-user taxes; i. e., the earnings of the highways themselves, plus a small percentage of aid from the federal government. Not only is this a true statement of facts, but also for some years the state has taken annually from its income from road-user taxes a large sum to aid the improvement of secondary roads.

While this is a noteworthy illustration of the earning capacity of highways as a single instance, it is recited here as typical of what is taking place in a large number of our states whose experience has followed the same broad outline, varied principally in detail and in rate of progress.

Highways and Income-Producing Investment

The substance exists in abundance upon which to turn this discussion into an exhortation of faith—faith in improved highways as an income-producing investment rather than a matter of governmental expense. Just now this is a note to be accepted to combat some of the false economy measures which are widely urged as a means to help end the world-wide economic depression.

This, or any other time, is not the proper time for a hysterical expansion of road building far beyond the capacity of the established organizations to administer or to build efficiently. But there has never been a period in modern times when a reasonable expansion of highway improvement has been supported by so many good and financially sound reasons. World-wide prosperous conditions would offer more good reasons for curtailing road work than the present situation, although it will be many years before any country can afford to curtail a reasonable annual program of new work in addition to a progressively more exacting maintenance of existing roads. Depression is producing roads at costs so low in comparison to former prices that the interest charges can be carried for some time before the total will reach what has been considered a fair price. At the same time employment is provided that materially aids a bad situation.

During February of this year, a month of minimum possibility for using labor on the roads, more than 170,000 men were employed on state and federal-aid road work, which does not include any local road employment. This number is rapidly increasing as weather conditions permit. When the economic pendulum swings the other way prosperity will throw additional traffic to the roads, which must be provided for with new construction.

Separating Expense from Productive Investment

These comments are induced by the temper of the moment to criticize governmental expenditures *in toto* without any attempt to separate expenses from productive investment. The present adverse conditions will pass, but along with the material causes for a return to more normal conditions, the elements of faith and far-seeing judgment will be potent factors in world-wide economic restoration.

Thus a discussion of highway finance, to be of any immediate value to an organization of international complexion and influence, must concern itself with fundamentals, which may be affected but cannot be proved unsound, by adverse conditions.

As a background there are certain essential considerations. The establishment of sound methods of financing must be predicated upon the time element and provide for continuity of operations. The improvement of modern highways adequate for any nation is a long-time undertaking, and to be accomplished must be established on a continuing basis. The annual rate can be expanded or contracted, but only reasonably so if the work is to be carried on economically and efficiently.

Much has been written concerning the changes brought about by the invention of the internal-com-

[1] Presented before the Committee on Highway Transport at the Sixth General Congress of the International Chamber of Commerce, May 5, 1931.

bustion engine, but very little academic discussion has centered around the perfection of the pneumatic tire, and its importance to the growth of highway transport has not been as yet fully evaluated. This combination has produced such wide flexibility in sizes and capacities of loads, such speeds, such riding comfort and in general such wide and unfettered utility in transportation that the growth in highway transport is continuous.

Although in many countries there have been already material changes, as time passes there will be a constant and profound readjustment in our economic and social structure because of the adaptation and expansion of highway transport.

U. S. Leads in Number of Motor Vehicles

The present utilization of highway transport may be approximately measured by the number of vehicles in use in proportion to area and also population. In Table I is indicated the total number of motor vehicles by countries and the number of vehicles per square mile and per 1,000 population.

The United Kingdom of Great Britain leads in the number of vehicles per square mile, 16.2, and Belgium follows with 13.5. The United States of America is first in number of vehicles per 1,000 population, 217.5, and Canada follows with 123.3. At the other extreme the number of motor vehicles in proportion to area and population is so small that the influence upon the economic life of the nation is relatively nothing. This does not indicate that highway transport is non-existing or not required; rather it indicates the long struggle ahead of these nations to provide adequate highways.

Highway Expenditures Small Part of Total Expenses

In the countries where highway transport has developed materially, the sums annually required for highway construction and maintenance are an important item of the annual governmental budgets. Taking the United States of America as an example of the nations in which highway transport has had a very large development, the annual budgets are shown in Table II. For the year 1930 the federal-government highway expenses totaled 2.19 per cent of the total federal budget receipts. The state expenditures for highways for the year 1929 were 21.3 per cent of the state budget receipts.

These percentages do not include the expenditures of municipalities or other governmental units smaller than the state for local roads. For many years these expenditures far exceeded the combined state and federal expenditures and now approximate them.

In some countries the local budgets for roads, other than streets in municipalities, are relatively small to the point of non-existence. In a few the total still exceeds the combined state and national budgets. These facts are only indicative of the extreme variations between countries and the utter futility of attempting comparisons or establishing like practices in countries. The financing of highways will always be a product of the economic structure of the country itself.

TABLE I—RELATION OF MOTOR VEHICLES IN VARIOUS COUNTRIES OF THE WORLD TO THEIR AREA AND POPULATION AS OF JAN. 1, 1931

(Data on foreign census of motor vehicles from U. S. Department of Commerce)

In Order of Motor Vehicles	Name of Country	Number of Motor Vehicles	Ratios: Motor Vehicles per Sq. Mile	Ratios: Motor Vehicles Per 1,000 Population
1	United States[1]	26,497,398	8.8	217.5
2	United Kingdom[2]	1,529,272	16.2	33.4
3	France	1,459,650	6.9	35.8
4	Canada	1,224,098	0.3	123.2
5	Germany	679,300	3.7	10.8
6	Australia	567,020	0.2	8.8
7	Argentina	366,324	0.3	33.6
8	Italy	293,215	2.4	7.1
9	Brazil	199,570	0.1	4.9
10	Spain	189,650	1.0	8.3
11	New Zealand	189,615	1.8	13.5
12	India	174,450	0.1	0.6
13	Union of South Africa	159,400	0.3	23.0
14	Belgium	158,986	13.5	19.9
15	Sweden	145,273	0.8	23.7
16	Holland	118,735	9.0	16.0
17	Denmark	110,324	6.5	32.1
18	Japan	95,719	0.4	1.1
19	Dutch East Indies	84,783	0.1	1.7
20	Switzerland	81,045	5.1	30.2
21	Mexico	80,801	0.1	4.9
22	Czechoslovakia	79,006	1.5	5.4
23	Algeria	50,250	0.2	5.4
24	Irish Free State	48,400	1.8	16.3
25	Hawaii	47,846	7.5	13.0
26	Uruguay	47,430	0.7	25.6
27	Norway	46,463	0.4	17.5
28	British Malaya	41,652	1.5	29.7
29	Poland	41,260	3.0	1.4
30	Cuba	41,222	0.9	11.4
31	Austria	39,209	1.2	5.9
32	Philippine Islands	37,049	3.9	2.9
33	Rumania	37,000	0.3	2.1
34	Chile	36,245	0.1	8.3
35	Finland	36,234	0.2	10.1
36	China	35,489	0.01	0.05
37	Egypt	32,627	0.1	2.3
38	Russia (U.S.S.R.)	30,910	0.004	0.2
39	Portugal	30,557	0.9	5.4
40	Ceylon	20,727	0.8	3.8
41	British East Africa	19,453	0.02	.17
42	Hungary	19,333	0.5	2.2
43	Greece	19,250	0.4	3.1
44	French Indo-China	18,595	0.07	0.9
45	Venezuela	18,000	0.1	5.9

[1] Includes 173,619 official cars.

[2] United Kingdom of Great Britain, distributed as follows:

England	1,306,458	25.7	35.1
Scotland	124,098	4.1	25.4
Wales	64,177	8.6	28.9
North Ireland	27,035	5.2	21.5
Channel Islands	5,690	75.9	63.2
Isle of Man	1,814	8.0	30.2
Total	1,529,272	16.21	33.4

Principles of Highway Finance Outlined

On the other hand, the general subject of highway finance with all of its ramifications has engaged the attention of representatives of national and international organizations for many years. From the periodic conferences and congresses has come a series of studies and conclusions that are beyond doubt ex-

pressive of international thought and experience. From these sources[1] a world-wide viewpoint is obtained.

It appears desirable to summarize briefly the principles expressed upon which there is apparently an international meeting of the minds of those who occupy positions of responsibility for and exercise authority over highway affairs in their respective countries. While, as indicated, wide differences in the economic structure and situations exist between the countries of the world, the same underlying principles are applicable to financial policies in all countries.

TABLE II—RELATION OF U. S. GOVERNMENT EXPENDITURES TO TOTAL RECEIPTS

Fiscal Year	Federal Budget Receipts	Highway Expenditure—Federal Aid, Forest Road and National Park	Per Cent Highway Expenditures to Total Receipts
1926	$3,962,755,690	$101,261,001	2.56
1927	4,129,394,441	94,917,218	2.29
1928	4,042,348,156	94,515,723	2.34
1929	4,033,250,225	97,433,182	2.42
1930	4,177,941,702	91,333,001	2.19

Receipts: Statistical Abstract of the United States, 1930, p. 171, Table 182; also World Almanac, p. 156 (U. S. Treasury figures).
Highway Expenditures: Federal-aid roads, U. S. Bureau of Public Roads; Forest Roads, U. S. Bureau of Public Roads and Forest Service; National Parks and Mt. Vernon Memorial Highway, U. S. Bureau of Public Roads.

These are grouped with particular reference to their dominant motive or particular application, but summarized in brief form which fails to develop the shades of meaning which may be necessary for application to any particular country. Also conditions would vary so widely that it must be emphasized that many exceptions can be found in individual countries to the application of general financial principles.

TABLE III—RELATION OF STATE HIGHWAY DISBURSEMENTS TO TOTAL STATE FUNDS AVAILABLE

Fiscal Year	State Budget Receipts	Highways—State Disbursements	Per Cent Highway to all State
1926	$3,288,904,527	$621,744,210	18.9
1927	3,548,465,739	707,179,148	19.9
1928	3,880,078,608	827,549,983	21.3
1929	4,274,318,100	910,485,291	21.3
1930			

Source: Financial Statistics of States (1926-1928). Table 2—Total Receipts (aggregate of receipts and cash on hand).

Group 1—Administrative Policies Essential to Sound Financing.—Highways should be classified. Broadly the division is (a) general-use highways, (b) local-use highways. These two general classes may be subdivided. The general-use highways would include the roads which are necessary to the development of highway transportation and which are used by the general public. The local roads would include those whose principal use is by those living upon or contiguous to them. The basis of highway classification is a study of the present and potential use.

A highway budget should be established covering necessary expenditures over a period of years. The budget should be measured not only by the desirable program of construction and maintenance but by other relative needs for public expenditure.

Group 2—Sources and Disposition of Highway Revenues.—The cost of the highway program should be distributed equitably in relation to the direct and indirect benefits to the various classes of persons or property benefited, taking into consideration the capacity of each class to pay, and the other taxes imposed. The principal sources of revenue are the following:

1. General taxes on property, which should be conserved so far as possible for the development of local roads.

2. Assessments for special benefits to property not to be used generally but in specific cases, and in proportion to special benefits arising through road improvement.

3. Road-user taxes including license fees and fuel taxes not exceeding a fair burden upon the highway user or the point of diminishing returns. The income from these taxes is to be used first for systematic maintenance of general-use highways, and the additional amounts for construction of the general-use highways or for the retiring of principal and interest of bonds for this purpose. All road-user taxes except necessary administrative expenses should be set aside and used solely for highway purposes. These taxes should be levied, collected and expended by a major governmental agency, either state or national.

4. Miscellaneous highway income. This principally includes appropriations made from general revenues; also any other special revenues made available for road purposes.

Group 3—Organization and Control.—Each major unit of government should maintain an adequate highway organization of trained technical personnel continued in office during competent service under civil service or similar fixed policy.

Each major organization must have sufficient direct or supervisory control over the road program to insure direction of expenditure to the improvement of roads in the order of their importance to the public, and to secure the objective of a unified system or systems where different parts are built under control of the component divisions of government. Financial assistance extended by the state and nation to the next order of governmental divisions is an effective method of securing important objectives. Thus national aid extended to the states provides a continuity of major highways between states and secures a correlated national system of highways; and state aid extended to the counties secures a desirable measure of supervision of the technical standards and a selection of improve-

[1] Conclusions upon Highway Finance:
5th International Road Congress, Milan, 1926.
6th International Road Congress, Washington, D. C., 1930.
1st Pan-American Road Congress, Buenos Aires, 1925
2d Pan-American Road Congress, Rio de Janeiro, 1929.
Joint committee of American Association of State Highway Omcials and U. S. Automobile Chamber of Commerce.
16th annual meeting, American Association of State Highway Officials, 1930.
4th Congress of International Chamber of Commerce, Stockholm, 1927.
5th Congress of International Chamber of Commerce, Amsterdam, 1929.

ment best calculated to supplement the state road system. This plan may be used to secure a more equitable distribution of costs between the divisions of government and sources of revenue.

Group 4—Anticipation of Revenues.—The anticipation of road revenues through bond issues for expediting improvement of general-use highways is sound if properly administered under competent management, and if the amount of the bonds issued bears a conservative relation to the assured income.

Group 5—Construction and Maintenance Programs.—Adequate maintenance costs should be regarded as a first obligation upon road revenues, and the balance of the income available for new construction should be used for improvement of a class or type justified by the potential earning capacity of the highway.

The Two General Classes of Rural Roads

Because of the competitive condition which has developed in this country between different forms of transportation, one phase of highway finance may be properly touched upon in an international meeting, since this same situation exists in greater or less degree in some of the other countries.

There are two general classes of rural highways, state and local roads. Federal financial assistance is extended to a portion of the state roads, which comprise in excess of 300,000 miles. Federal aid is limited in its application to about two-thirds of this mileage. While the local roads in the aggregate include about 2,700,000 miles, the competition which exists between rail and highway transport is confined almost wholly to the state systems. Those systems taken as a whole cover the United States with a network of highways reaching every important city and town, and furnish the routes for all principal intrastate as well as interstate highway traffic movement.

There is a very small amount, if any, of private-car, motor-bus or motor-truck operations which is competitive in any way with the steam railroads on other than the state systems. Since these comprise the highways of general use, the road-user taxes have been largely devoted to their construction and maintenance.

Two policies have been followed. In some states the annual total of road-user taxes has been expended, first, for maintenance, and second, to carry on as large a program as possible of new construction. In many other states, after deducting maintenance requirements, a considerable portion of the balance is being used to pay the interest and retire the principal of bonds issued in anticipation of these revenues. Any remaining balance is used for new construction.

There have been no bond issues in recent years of any considerable size for state road purposes which were not predicated upon the road-user taxes. If, therefore, the total expenditure for state highways is considered for the past ten years, the percentage of this total supported by the road-user taxes shows a steady and large increase.

Road-User Taxes Amounted to 78 Per Cent of Total Expenditure

The total disbursements by the states for state highways in 1929 were $864,000,000. The income from the motor-vehicle fees and the gasoline taxes for the same year devoted to this purpose was $565,000,000. The bonds issued in anticipation of the road-user taxes amounted to $114,000,000 of the total disbursement, bringing the percentage of total expenditure supported by the road-user taxes to 78 per cent.

The tendency is growing rapidly toward the elimination of all general property taxes by the states in supporting the state road program, and any taxes levied upon the railroads and used for this purpose can be dispensed with without impairing the ability of the states as a whole to carry on an adequate state highway program.

The Financing of Local Roads

The local roads can not fairly be brought into any discussion of competition between rail and highway transport, since the rail movement is from station to station, and highway movements, between towns and cities are almost exclusively over the state highways.

In 1929 approximately $750,000,000 was spent for the improvement of local roads, exclusive of city streets. Road-user taxes to the extent of $122,000,000 were used for these roads, or about 16 per cent, plus the bond issues used for this purpose supported from the user taxes.

The only question that would seem to be reasonably germane to the matter of expenditures for local roads is whether the taxes paid by the railroads which are used in any measure for this purpose are fair or unfair; that is, this is not a question between the road-user taxes and railroad taxes. The matter of fairness of any taxes levied upon the railroads for the development of local roads can never be determined so long as taxing authority over the railroads is distributed among so many taxing bodies.

In the highway field it has been a strong contention that the user taxes should be levied, collected and expended under the direction of the state, and this would seem to be a reasonable plan to follow in considering any measures of relief for taxation of the railroads. In this connection, there has been a tendency to total highway expenditures for both state and local roads, and consider the road-user taxes in relation to the whole. There is a vast mileage of public roads and streets whose only service is to the land, whether it be used for any character of agriculture and other purposes, or in cities for residential areas. On these there is no general flow of highway traffic. Their improvement certainly cannot be made a fair charge against the road user.

The adjustment between state and local roads is rapidly taking place in two ways: (1) By an absorption

(*Continued on page* 22)

« « EDITORIAL » »

The Pittsburgh Convention

FOR the first time since the formation of the National Crushed Stone Association in 1918, its annual convention will be held within the environs of Pennsylvania, Pittsburgh having been selected as the meeting place for 1932. The invitation to come to Pittsburgh was presented on behalf of the crushed stone industry in Pennsylvania by the Pennsylvania Stone Producers' Association, one of the strongest local groups throughout the country. That the Board should have selected Pittsburgh with less discussion than has taken place in a number of years by no means reflects a scarcity of invitations representative of the prominent cities of the United States and Canada, but is a well deserved recognition of the fact that Pittsburgh, viewed from practically any angle, is justly entitled to the 1932 meeting.

Geographically speaking, Pittsburgh was a wise selection. Pennsylvania enjoys the distinction of being the largest producer of stone, followed by Ohio, Michigan, New York and Illinois. As Pittsburgh is located in the extreme western end of the State it will be easily accessible to the centers of production requiring, for a very large percentage of the industry, but an overnight ride. Coupled with this, the fact that the usual arrangements will be made with regard to reduced railroad fare, should make attendance at the Pittsburgh convention possible with economy of both time and money.

Pittsburgh's leading hotel, the William Penn, is exceptionally well equipped to adequately take care of our unusual requirements. The convention activities will be located on the seventeenth floor, accessible by express elevators, and will be exclusively set aside for our use. The Manufacturers' Division Exposition will be housed in the Pirate Hall, a particularly attractive room located but a few steps below the main lobby. An advantage which will appeal to exhibitors is the fact that the entire exposition can be housed in this one room, an asset which has not always been enjoyed in the past. The Pirate Hall is easily accessible to the street, and is served by a freight elevator having ample capacity to take care of the largest pieces of equipment which will be on display, thus eliminating the necessity of dismantling machinery in order to get it into the exposition hall. Adequate power facilities are available and those exhibitors which may require gas and water will find them available from outlets already provided for in the hall. Through a fortunate circumstance, the annual meeting of the National Sand and Gravel Association will also be held at the William Penn Hotel during the week immediately following the convention of the National Crushed Stone Association. The experience of last year, when a similar situation existed in St. Louis, indicated that a large percentage of the manufacturers held exhibits at both of these conventions. It will therefore be welcome news for those who come in this classification to learn that arrangements have been made with the William Penn Hotel whereby exhibits, if desired, may remain in place throughout the two weeks' period.

It is needless to say that every effort will be made to formulate a program for the Pittsburgh convention of outstanding interest and merit and it is recognized that the membership at large can be decidedly helpful in this regard. It is proposed in preparing the Pittsburgh program to proceed along the general lines which have proved so successful in past years, benefiting of course by the experience which has been gained. The present year is an unusual one, and will no doubt give rise to unusual problems which will require discussion at the forthcoming annual meeting. Suggestions as to appropriate subjects will be more than welcome and should be sent in to the Secretary's Office at once. Many of our members are without doubt acquainted with, or know of, excellent speakers who would materially assist in making the program more interesting and informative. Such information is very much desired and should be sent in immediately.

In view of present conditions, the forthcoming annual meeting of our industry will unquestionably be the most significant held in the history of the Association. With a city excellently located geographically; a hotel particularly well arranged to adequately meet our requirements; with hotel rates in effect which will appeal to all; and with a local group which is enthusiastically undertaking to entertain the convention in a manner which will leave nothing to be desired, we confidently express the belief that our Fifteenth Annual Convention will more than measure up to the high standards established by past conventions.

Accidents Can Be Prevented

THE opinion is often expressed that because of the many hazards inherently associated with the crushed stone industry, it is practically impossible, if not entirely so, to produce crushed stone without having a certain number of so-called unavoidable accidents, and unfortunately there are still many within our ranks who apparently cannot accept the fact that this is an exploded theory. We have on previous occasions

endeavored to bring to the attention of the industry the fallacy of this argument, and because as each year progresses the evidence becomes more conclusive, we again find ourselves in the position of saying that, "Accidents can be prevented!"

The inspiration for this latest attempt lies in the result of the Association's 1930 safety contest, reported elsewhere in this issue by W. W. Adams, of the United States Bureau of Mines, under whose supervision the contest is held. If interested in accident prevention you will find much in Mr. Adams' article to justify your interest. If you belong to that class which have all too long hidden behind the excuse that it can't be done, you owe it not only to yourself but to your company and the men who work for you to give this article your careful and sympathetic attention. Not to do so will inevitably cost you dollars and cents. A program of accident prevention, aside from being justifiable from the humanitarian point of view, has been positively demonstrated as an effective means for increasing efficiency and producing very much worthwhile economies in production.

To return to our original premise—that accidents can be prevented—at the Fourteenth Annual Convention of the Association held last January in St. Louis an appropriate trophy was awarded to the Speed Quarry of the Louisville Cement Company for having completed five successive years of operation with no lost-time accidents. This company certainly demonstrated the fact that it could prevent accidents. The Cape Girardeau plant of the Marquette Cement Manufacturing Company in winning the safety contest for 1930 has completed three successive years with no lost-time accidents, and is well along the road of equalling the five-year record of the Louisville Cement Company's Speed plant. But mention has so far only been made of those companies which have enjoyed the distinction of making outstanding long-time records in accident prevention work. In the contest for 1929 there were six plants which completed that year with no lost-time accidents, while in the contest for 1930 seventeen plants enjoyed this distinction. Is it necessary to reiterate that accidents can be prevented? The question answers itself.

As to what extent, if any, the safety contest is responsible for the remarkable improvement which has been made since the introduction of the competitive idea in promoting accident prevention, it would seem to us that it has fulfilled a definite and valuable function. It has decidedly increased interest in accident prevention among the members of the National Crushed Stone Association. In 1925, forty-one plants were entered in the safety contest, while in 1930 seventy-four plants were entered. This corresponded in 1925 to a total exposure of 4,927,396 man-hours, while in 1930 the total exposure amounted to 8,013,415 man-hours. In 1925 but one plant made a perfect record, while in 1930 seventeen plants completed the year with no lost-time accidents.

Of particular significance is the analysis made by Mr. Adams of the twenty-five quarries which have been entered in the contest each year since its inception six years ago. In 1925, these twenty-five quarries had 48.7 accidents per million man-hours of exposure, while in 1930 they had only 22.2 accidents per million man-hours of exposure. Contrasted to this, all quarries in 1925 had 60.7 accidents per million-man-hours of exposure, while in 1930 all quarries had 30.2 accidents per million man-hours of exposure. The benefit of continued participation in the safety contest is thus clearly demonstrated.

Is it not high time that crushed stone producers should recognize the clear, simple truth that accidents can be prevented and systematically undertake a comprehensive program of accident prevention? Certainly there are few other opportunities which offer such sure promise of regularly paying dividends—depression or no depression.

Portland Cement Association Elects E. J. Mehren President

BY ELECTING a president from outside the industry who will devote his whole time to the position, the Portland Cement Association, so the chairman of its Board, Frank H. Smith, announced today, has broken two precedents of long standing. Heretofore the leader of the Association has been a president of one of the portland cement manufacturing companies. During his term of office he has not only guided the work of the Association but has also continued to operate his own company. The duties of Association president are so heavy, however, that the industry felt it unfair to continue to impose this burden upon the president of any one of its member companies.

Consequently, the Board of Directors has elected as president, Edward J. Mehren, vice-president of the McGraw-Hill Publishing Company. Mr. Mehren has been prominent in engineering and business circles through his participation in the work of engineering societies and business organizations.

He was editor for ten years of *Engineering Record and Engineering News-Record*, the leading publication of the construction industry. Later he became vice-president and editorial director of the McGraw-Hill Publishing Company, and latterly has been in charge of the company's activities in the Middle West, with headquarters at Chicago. He has been at various times a member of the executive committee of the New York Building Congress and father of its well known craftsmanship awards system; director of the American Road Builders' Association, member of the committee on highways and motor transport of the U. S. Chamber of Commerce; chairman of the Marketing Problems Committee, Illinois Manufacturers Association. He is a member of the American Society of Civil Engineers, of the Western Society of Engineers,

the University Club, New York; the Union League Club, Chicago. He is a graduate of Loyola University, Chicago, and of the University of Illinois. Mr. Mehren assumes his new office September 1.

Quarry Section to Have Interesting Program at Annual Safety Congress

DURING the week of October 12 to 16, many delegates from mining, cement and quarry industries of the United States will meet at the Stevens Hotel in Chicago to carry out conference programs to consider practical ways and means for the reduction of accidents and accident costs in these industries.

These accident prevention programs, as an important part of the Twentieth Annual Safety Congress and Exposition, will be conducted by three different co-operative groups of the National Safety Council—namely, the Mining Section, the Cement Section and the Quarry Section. In the total these three groups represent a considerable percentage of the membership of the National Safety Council and these groups have been pioneers in the promotion of the "national safety movement" in the United States.

The four sessions of the Cement Section program will be introduced by the annual report of General Chairman R. B. Fortuin, Pennsylvania Dixie Cement Corporation. W. L. White, Jr., Asst. General Manager, Medusa Portland Cement Co., will discuss "The Relation of Labor Turnover to the Accident Curve," and R. A. Finch of the Bureau of Safety will discuss "Accident Investigations from the Employee Point of View."

The Wednesday morning session will have two important addresses on "The Advantage of Physical Examination and Re-examination to the Employee" by W. J. Fenton of American Red Cross, and "Minimizing Pulverized Coal Dust Hazards in Cement Mills" by D. Harrington, Chief Engineer of the Safety Division of the U. S. Bureau of Mines.

The Wednesday afternoon session will be held jointly with the Quarry Section and will feature an open discussion of "The Value of the Plant Magazine," and an address by Prof. S. N. Stevens of the Dept. of Psychology, Northwestern University.

In addition to joint luncheon and program sessions on Wednesday with the Cement Section, the Quarry Section will have special morning and afternoon program sessions on Thursday. These will be introduced by remarks by General Chairman A. L. Worthen of the Connecticut Quarries Co., Inc. The morning sessions will have three special features—"The Progress of Safety in the Quarry Industry" by W. W. Adams, Chief Statistician, Demographical Div., U. S. Bureau of Mines; "The Executive's Viewpoint of Safety in the Quarry Industry" by John Prince, President, Stewart Sand and Material Co.; and "The Superintendent's Viewpoint of Safety in the Quarry Industry" by E. M. Gould, Supt., Cape Girardeau Plant, Marquette Cement Mfg. Co.

The Thursday afternoon session will give especial consideration to the question of compensation insurance. There will be an address on "The Operations of the National Council on Compensation Insurance and its Relation to Compensation Insurance Rates," by a representative of the National Council on Compensation Insurance Rates; and an address on "The Relationship of Insurance Companies to the General Promotion of Accident Prevention," by a speaker not yet announced.

One of the features of the Congress will be the Annual Safety Exposition in the large exhibit hall of the Stevens Hotel. More than 100 exhibitors will display a panorama of standard safety equipment, and latest developments in safety appliances. This exhibit will include many articles of interest to the mining, cement and quarry industries. There will be displays, for example, of non-sparking tools, safety goggles and helmets and masks, protective clothing of all kinds, and a great variety of other mine safety equipment.

The general safety exhibit of interest to all industries will include fire protection equipment, safety ladders and scaffolding, leather safety appliances and belts. There will be a display of such efficiency equipment as electric floor scrubbing and polishing apparatus, improved industrial lighting, improved chair and other devices to lessen fatigue. There will be exhibits of factory sanitary equipment, safety emblems and trophies and awards, and extensive displays of first aid materials.

The Safety Congress will have a total of 130 sessions in 45 different divisions. The 350 speakers will include outstanding national safety authorities, industrial and business leaders, governmental officials and professional specialists. The program has been so arranged, through a "staggering" of the sessions, that delegates may attend other sessions than those of their own industry.

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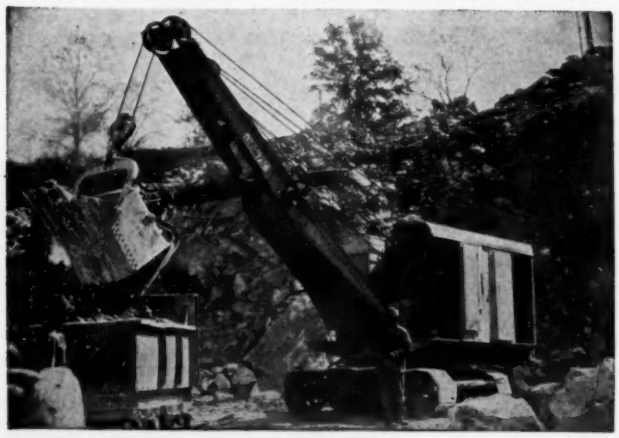

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Board of Directors Selects Pittsburgh for Fifteenth Annual Convention

(*Continued from page* 7)

tablished by the Federal Trade Commission and as subsequently approved and accepted by them and also by the industry are given elsewhere in this issue.

The following members of the Board of Directors and their guests were present at the meeting:

Max A. Altgelt, New Braunfels, Texas.
Wm. M. Andrews, Youngstown, Ohio.
J. E. Cushing, Schenectady, N. Y.
C. M. Doolittle, Hamilton, Ont., Canada.
F. O. Earnshaw, Youngstown, Ohio.
Otho M. Graves, Easton, Pa.
F. T. Gucker, Norristown, Pa.
W. E. Hilliard, New Haven, Conn.
E. J. Krause, St. Louis, Mo.
A. S. Lane, Meriden, Conn.
B. A. McKinney, West Roxbury, Mass.
Russell Rarey, Columbus, Ohio.
John Rice, Easton, Pa.
J. A. Rigg, Alderson, W. Va.
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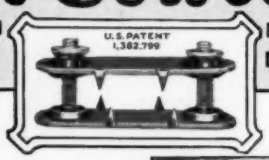
Tight Butt Joints

COMPRESSION PRINCIPLE



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The recessed plates embed in the belt and compress it instead of pulling against the bolt holes. This provides great surplus strength. It equalizes the pull throughout the plies. Keeps belt ends intact avoiding trouble. FLEXCO H D Belt Fasteners are in extensive use throughout many industries, giving long reliable service wherever tight butt joints are desired on conveyor and elevator belts. Made in steel and in monel metal. Sold by jobbers and belting houses in 5 sizes. Recommendations supplied gladly.

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Belt Fasteners

Highway Financing As a Productive Investment

(*Continued from page* 18)

of the more important local roads into the state systems, there to be financed in large part by the user taxes; and (2) by the allocation of a goodly percentage of the user taxes for the use of the local roads. This adjustment is taking place continuously, so that each year will show an increasing percentage of the total cost of all roads of general use paid from the user taxes.

These observations are not intended to be conclusive, but rather indicative of the desirability of a more careful study and a more complete understanding of the existing facts, and the trends of highway financing, especially as it relates to the conflicts between transportation agencies. Certainly every effort should be made to bring about relative fairness in all matters vitally affecting the different types of transportation.

The angularity of crushed stone is an invaluable asset in making for stability of traffic bound roads, bituminous macadam, bituminous concrete and railroad ballast.

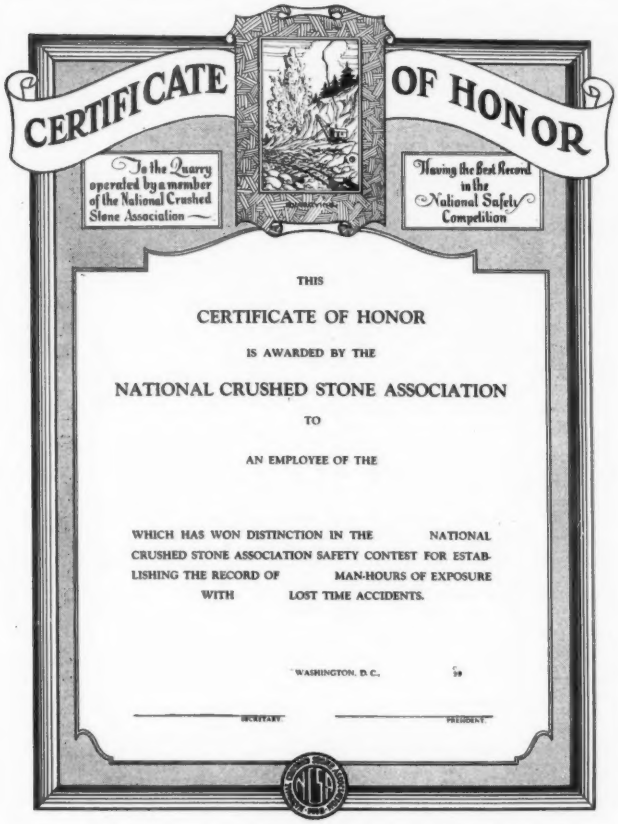
Marquette Cement Manufacturing Company Wins Safety Contest for Third Successive Year

(*Continued from page* 14)

Stone Company received honorable mention in 1929, as did also the North Baltimore Limestone Quarry of the France Stone Company.

Winners Will Receive Certificates of Award

As previously stated the winner of the contest is presented with the *Explosives Engineer* award, a bronze plaque on which is portrayed in bas-relief the quarry scene on the pedestal of the Sentinels of Safety


CERTIFICATE OF HONOR

In the Quarry operated by a member of the National Crushed Stone Association

Having the best Record in the National Safety Competition

THIS

CERTIFICATE OF HONOR

IS AWARDED BY THE

NATIONAL CRUSHED STONE ASSOCIATION

TO

AN EMPLOYEE OF THE

WHICH HAS WON DISTINCTION IN THE NATIONAL CRUSHED STONE ASSOCIATION SAFETY CONTEST FOR ESTABLISHING THE RECORD OF MAN-HOURS OF EXPOSURE WITH LOST TIME ACCIDENTS.

WASHINGTON, D.C.,

SECRETARY. PRESIDENT.

Presented to each employee of each plant completing the year with no lost-time accidents

Trophy, which is the award for the National Safety Competition. To each plant receiving honorable mention there is presented a parchment reproduction of the *Explosives Engineer* award, and to each employee of all the plants which complete the year with no lost-time accidents the National Crushed Stone Association presents a certificate of honor. As has been the custom for a number of years, the trophy and parchment reproductions will be formally presented at the Fifteenth Annual Convention of the Association which will be held in Pittsburgh, January 19 to 22, 1932.

A TESTING UNIT
... worth its cost many times over

IT'S SUCH a simple matter to take a good sample of coarse material, run it through the Weston Testing Screen and get an accurate analysis.

Each of the four trays will hold a generous supply of any desired size. These four sizes with the reject will give a good cross-section of the crusher product or what is finally going into the bins.

Time and money are saved with the Weston Screen. It is the handiest unit any operator can have in his plant. Send for an illustrated folder for the details.

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BALTIMORE BIRMINGHAM BOSTON CINCINNATI CLEVELAND DETROIT HAZLETON NEW YORK PHILADELPHIA PITTSBURGH

Makers of ***Hendrick Perforated Metal Screens, Elevator Buckets of All Types,*** Mitco Interlocked Steel Grating, Mitco Shur-Site Treads, Mitco Armorgrids

THIS BUILT-UP MANTLE Outlasted the Original Mantle! ...built-up with TIMANG *(air-toughening)* Welding Rod

Photo shows worn out mantle being built-up with TIMANG (air-toughening) welding rod.

- TIMANG (air-toughening) Welding Rod has brought mantle costs to a new low level in this large crushed stone plant. Read what the operator of this plant said in a recent letter.

"The built-up mantle has been in service for a full season and it is still good for additional service. The original mantle was used one year when we discarded it as worn out."

- The cost of building-up this mantle with TIMANG—including all labor and materials—was only half the cost of a new mantle!
- You can extend the life of your wearing parts many times — effect similar economies — by welding with TIMANG. Let us send you full details. Communicate with the nearest Tisco office or write direct to High Bridge.

Welds made with TIMANG have the same hardness, the same resistance to wear, as 12% manganese steel. TIMANG is an exclusive product of Taylor-Wharton Iron & Steel Co.

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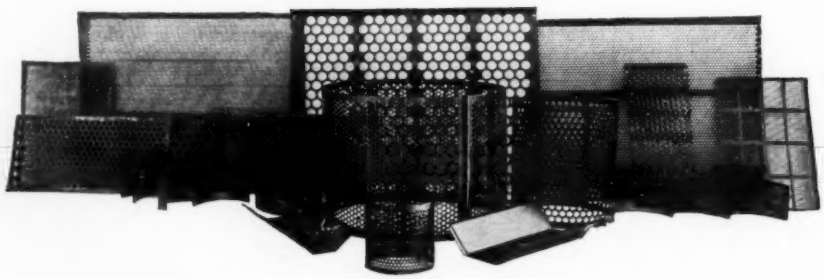

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CARBONDALE, PA.

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OF THE

National Crushed Stone Association

WILL BE HELD AT THE

William Penn Hotel
Pittsburgh
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January, 19, 20
21, 22, 1932

Pittsburgh in 1932

¶ In conjunction therewith the Manufacturers' Division will hold its annual Exposition of Quarry Equipment and Machinery which has come to be recognized as one of the outstanding events of the meeting.

¶ Make your plans now to attend this annual foregathering of the crushed stone industry.

¶ All crushed stone producers of the United States and Canada, regardless of whether or not they are members of this Association, are most cordially invited to be present at Pittsburgh and share with us the many pleasures and benefits of the Convention.

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